Kendra Wheeler

Hog Creek Review

The Missing Link Between Faces and Names: Evidence from Alzheimer's Disease Patients

The more important article, from the two that I have previously summarized, is *The missing link between faces and names: Evidence from Alzheimer's disease patients*. This study looked at previous research on the same subject and attempted to correct the design faults from these experiments, as well as attempted to clarify some of the mixed results that had previously been found.

The question that sparked the researchers' interest in this topic was: To what extent do regular, temporary lapses in memory have an effect on sufferers of Alzheimer's disease? Everyone forgets things from time to time, and we have all experienced the "tip of your tongue" phenomenon, where a specific word or name is being searched for, but you are unable to grasp it at that precise moment. The researchers who conducted this study wanted to compare Alzheimer's disease patients to seemingly healthy, age-matched adults at a task of naming some famous faces.

The study used a matched-subjects design, using twenty-three elderly controls and twenty-three Alzheimer's disease patients, diagnosed based on neurological and neuropsychological evaluations, meeting the criteria set by the National Institute of Neurological and Communication Disorders and Stroke Alzheimer disease and Related Disorders Association. The participants were matched for age as well as education, and performed a series of tests for a neuropsychological assessment, which all included participants scored within the normal range on all measures.

This was a quasi-experimental study, meaning that the researchers were unable to assign individuals to certain conditions, since their pre-existing condition (Alzheimer's

disease) could not be chosen for them. This study was a 2 x 3 factorial design, having a control group and an experimental group, along with three levels of the independent variable.

This study explored two different priming effects; semantic and identity priming. Semantic priming occurs when a first object is shown-the prime- (such as a picture of former President Bill Clinton), and then a second, meaningfully related item is shown-the target- (like current President Barack Obama's name). Recognition of the second target item is quicker than if two unrelated items had been shown, assumed to occur because of spreading activation from the original object to similar representations of the same type (in this example, presidents, or more broadly, politicians).

Identity priming, on the other hand, occurs when the prime (again, Bill Clinton's face) is shown and later the target is shown (in this case Bill Clinton's name). The target is recognized faster than if the two items had not been related, "due to the activation of each proper name associated to the corresponding face." Generally, the effects of identity priming are larger than the effects of semantic priming because the prime and the target are examples of the same identity, which works as repetition priming.

There were three levels of the independent variable; faces used as primes for target names. The first was same person (identity priming), where the target name followed the same person's face as the prime. The second was same occupation, where the face of a person was shown, followed by the name of someone from the same job category (like the previous example of Bill Clinton's face being shown before the name of Barack Obama). The third was a target name preceded by the face of a different person from a different occupation (for example, a picture of Bill Clinton being shown, and then the name of Vincent van Gogh).

The hypothesis was that if the deficits patients with Alzheimer's disease experience are the result of deficits in access to semantic memory (which we all experience every now and again), then similar semantic and identity priming effects should be observed in patients with Alzheimer's disease as well as healthy older adults, the controls in the study. However, if the deficits Alzheimer's disease patients experience are due to a deterioration of

information that is stored in semantic memory, then different priming effects should be observed among the controls and the Alzheimer's patients.

The study had two parts. In the first part, each participant was shown a set of 45 pictures (15 from each of three categories: politicians, artists, and sportsmen), and then asked to give the first and last name of the person pictured. The order in which the photographs were shown was random, and only pictures with a correct response rate of 80 percent or higher from a pilot naming task were included in the test. Furthermore, participants were asked to report the occupation of the person in the picture. If the participant was unable to give the name of the person in the photograph, the experimenter gave the participant a cue (being the first name of the person in the photo). The pictures remained on the screen until a response was given.

The second part of the experiment involved each participant being shown a set of 90 famous faces, split up into two sessions of 45 pictures each, one at a time presented on a screen. Each photo was shown for 500 ms, then a blank screen of 300 ms, then a name appeared on the screen until the correct response was given or until 5000 ms. Each picture was shown only once, and half the pictures were artists and the other half were politicians. Participants were instructed to push 'P' if the target (name) that followed the prime (picture) was of a politician, or 'A' if the name was of an artist.

The dependent variable was accuracy and percent correct of primed faces and target names. Reaction times were recorded and any score(s) three or more standard deviations above or below the mean were discarded. Furthermore, only correct responses were counted in the analysis of variance.

The researchers conducting this study used a priming technique which minimized the impact of explicit memory retrieval, unlike past studies on the same subject. Previous research used tasks involving explicit measures of semantic memory, which led researchers to conclude that Alzheimer's disease patients showed significant impairment in explicit, semantic memory retrieval when compared to controls.

Other studies using the semantic priming technique have come up with mixed results. Some tests concluded that there is little difference between control groups and Alzheimer's

disease patients, "suggesting intact semantic representations regardless of one's ability to retrieve those representations." One study however, tested controls and patients with Mild Cognitive Impairment (MCI), which is the pre-clinical stage of Alzheimer's disease. This study tested identity and semantic priming effects, and found a lack of priming in patients with MCI, concluding that the degradation of the semantic memory system results in difficulties accessing a person's specific information.

The results show that Alzheimer's disease patients were correct 26.5% at giving the first and last name of a picture versus 57.2% for the controls. When given a cue about the picture (the first name), Alzheimer's patients were correct 60.1% versus 77.4% for controls. When asked to give the occupation of the pictured person, Alzheimer's patients correctly identified 80.2% whereas the controls identified 89.9%. Overall, Alzheimer's patients were accurate 80% of the time, versus 91.2% for the controls.

When the prime (face) was shown of the same target (name), participants were correct 89.2% of the time. If the prime and the target were of the same occupation, participants were 88.5% accurate. And when the prime was in a different occupation than the target, participants were accurate 79% of the time.

The main effect indicated that Alzheimer's patients had slower reaction times when compared to the elderly controls (3923 ms versus 2446 ms). Also, all three conditions showed significant differences between Alzheimer's patients and the healthy, elderly control participants. Priming effects were present in both controls and Alzheimer's patients, but the magnitude of the effects differed. Elderly controls showed larger effects in identity priming compared to Alzheimer's patients. However, semantic priming was not statistically significant between the two groups.

The main contribution of this study was that the researchers concluded that "problems of Alzheimer's disease patients when accessing proper names are due to semantic memory degradation and not only to access deficits." Furthermore, the study revealed that "not all types of semantic information associated to known faces are equally degraded by Alzheimer's disease."

The authors of this study do note that It is possible, that information regarding a specific feature (such as a proper name) is more susceptible to deterioration than features that are less distinctive and more shared (such as a common name). Other researchers have formed similar conclusions from different studies. The authors conclude that further research is necessary to form a decisive conclusion regarding this matter, but this study provides a strong support and reference for future research on the topic.

This study showed an intriguing dissociation in priming effect patterns, which could be expanded on to better understand the organization of semantic memory of proper names. The authors note that common names have stronger referents and are therefore less likely to be vulnerable to brain degradation, as compared to proper names. The authors offer the explanation of this study that biographic information, such as a person's occupation as well as other people with the same occupation, is shared with the knowledge of a person's face. Furthermore, "the representation of the biographic information is not degraded, but rather, only not accessible when explicitly retrieved."

References

Calabria, M., Sabio, A., Martin, C., Hernández, M., Juncadella, M., Gascón-Bayarri, J., & ... Costa, A. (2012). The missing link between faces and names: Evidence from Alzheimer's disease patients. *Brain & Cognition*, *80*(2), 250-256. doi:10.1016/j.bandc.2012.07.002